

REMARKS

Claims in the case are 2-15, 18, 20, and 22-24, upon entry of this amendment. Claims 2, 6, 7, 9, 10-15 and 23 have been amended, Claim 24 has been added, and Claims 16 and 17 have been cancelled herein. The subject matter of cancelled Claim 16 has been incorporated into Claim 2 as optional additive G), by amendment herein. Basis for added Claim 24 is found in Claim 14 and at page 17, lines 20-25 of the specification.

The Title of the specification stands objected to. The Title has been changed by amendment herein, and is deemed to be clearly indicative of the invention to which Applicants' claims are directed. In light of the change to the Title, a new Abstract is included herewith. Reconsideration and withdrawal of this objection is respectfully requested.

Claims 2, 6, 7, 9-16, 22 and 23 stand rejected under 35 U.S.C. §112, second paragraph. This rejection is respectfully traversed in light of the amendments herein and the following remarks.

Claim 6 has been amended to replace "derivative of unsaturated carboxylic acids" with --anhydrides of unsaturated carboxylic acids and imides of unsaturated carboxylic acids--. Basis for this amendment to Claim 6 is found at page 10, lines 15-16 of the specification.

The duplicate recitation of "iron oxides" has been removed from Claim 14 by amendment herein. The claims have been amended herein to include proper Markush language.

In light of the amendments herein and the preceding remarks, Applicants' claims are deemed to particularly point out and distinctly claim the subject matter which they regard as their invention. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 2-18, 20, 22 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over European Patent Application No. EP 0 728 811 (**Maruyama et al**) in view of United States Patent No. 5,849,827 (**Bödiger et al**). This rejection is respectfully traversed with regard to the amendments herein and the following remarks.

The thermoplastic molding composition of Applicants' claims consists essentially of: (A) an aromatic polycarbonate and/or polyester carbonate; (B) a graft polymer; (C) optionally a thermoplastic vinyl (co)polymer and/or polyalkylene terephthalate; (D) a phosphazene selected from those represented by formulas Ia and/or Ib (see Claim 2); (E) finely divided inorganic powder having an average particle diameter of less than or equal to 200 nm; (F) optionally a fluorinated polyolefin; and (G) optionally at least one additive, e.g., a lubricant and/or mold release agent.

The thermoplastic compositions according to Applicants' present claims provide a desirable **combination** of: (i) excellent flame resistance; and (ii) physical properties including, improved weld-line strength, notched impact strength and environmental stress cracking resistance. Applicants wish to direct attention to the Examples, and in particular the Table on page 27, of the specification. Relative to comparative Example 1 (which does not contain particulate aluminum hydroxide), Examples 2 and 3 (according to the invention) provide a desirable combination of good flame resistance and improved mechanical strength. More particularly, Examples 2 and 3 have improved notched impact strength, softening point, weld line strength and environmental stress cracking resistance relative to the comparative composition of Example 1.

Maruyama et al disclose thermoplastic resin compositions comprising an aromatic polycarbonate, a graft copolymer and a phosphazene (abstract). The compositions of Maruyama et al are disclosed as optionally containing additives, including fillers, such as talc (page 5, lines 15-19). Maruyama et al do not disclose or suggest the particle size of the fillers that may optionally be present in their thermoplastic resin compositions. Applicants wish to point out that commercially available talc typically has an average particle size in excess of 200 nm. In particular, commercially available talcs typically have average particle size diameters (d_{50} values) of 0.5 μm (500 nm) to 8 μm (8000 nm). See the commercial talc data sheets in the appendix included herewith.

Maruyama et al teaches away from the use of phosphorous compounds other than phosphazenes, such as phosphates (e.g., trixlenyl phosphate) and phosphoric esters (e.g., phosphoric ester oligomers). See the examples, and in particular

page 6, line 51 through page 7, line 39, and Table 1 on page 8 of Maruyama et al. On page 3 of the Office Action of 1 July 2002 it is argued that Maruyama et al does not teach away from the use of non-phosphazene phosphorous compounds, in that Maruyama et al provide no indication that a blend of flame retardants or auxiliary flame retardant would be unwelcome. Applicants respectfully disagree. Maruyama et al provide no disclosure, suggestion or teaching as to a composition that includes a blend of phosphazenes and non-phosphazene phosphorous compounds. What Maruyama et al clearly shows and teaches is that their thermoplastic compositions which contain phosphazenes provide improved flame resistance relative to comparative compositions that contain non-phosphazene phosphorous compounds, such as trixylenyl phosphate. Applicants submit that in light of what Maruyama et al actually discloses, one of ordinary skill in the art would interpret such disclosure as teaching away from the use of non-phosphazene phosphorous compounds. It is further submitted that, one of ordinary skill in the art would not reasonably be expected to interpret Maruyama et al's disclosure as representing in any way a suggestion to blend phosphazene and non-phosphazene phosphorous compounds.

Bödiger et al disclose a thermoplastic molding composition comprising aromatic polycarbonate; extremely finely divided inorganic powder, e.g., aluminum oxides and TiO_2 , having a mean particle diameter of 0.1 to 100 nm; and a flame retardant (abstract and column 7, lines 24-53). The phosphorous compounds of Bödiger et al are disclosed as preferably including those represented by formula (VIII) in column 8. However, Bödiger et al do not disclose or suggest the use of phosphazenes in their compositions.

It is argued on page 3 of the Office Action of 1 July 2002 that Bödiger et al disclose an improvement in flame retardance that is related to the use of extremely finely divided inorganic powder, and that such disclosure would lead one of ordinary skill in the art to use the extremely finely divided inorganic powder of Bödiger et al in the compositions of Maruyama et al, for the purpose of improving flame retardance. Applicants respectfully disagree. Bödiger et al's disclosure is in no way indicative or predictive of achieving improved flame resistance in phosphazene containing compositions. In fact, the examples of Applicants' present specification show that the flame resistance of a phosphazene containing composition is not improved by

the inclusion of finely divided inorganic powders therein. See the physical properties listed for comparative Example 1, and Examples 2 and 3 (according to the invention) in the table on page 27 of Applicants' specification. As such, Bödiger et al does not provide the requisite motivation to combine its disclosure with that of Maruyama et al.

Further, Bödiger et al do not disclose or suggest the use of phosphazenes in their compositions. Maruyama et al teach away from the use of phosphorous compounds other than phosphazenes, such as those phosphorous compounds disclosed by Bödiger et al and represented by their formula (VIII). As such neither Maruyama et al nor Bödiger et al provide the requisite teaching that would motivate one of ordinary skill in the art to combine their respective disclosures.

As the Court of Appeals for the Federal Circuit has stated, there are three possible sources for motivation to combine references in a manner that would render claims obvious. These are (1) the nature of the problem to be solved, (2) the teaching of the prior art, and (3) the knowledge of persons of ordinary skill in the art, In re Rouffet, 47 USPQ 2d 1453, 1458 (Fed. Cir. 1998). The nature of the problem to be solved and the knowledge of persons of ordinary skill in the art are not present here and have not been relied upon in the rejection. As for the teaching of the prior art, the above discussion has established that neither of the patents relied upon in the rejection provide the requisite teaching, and certainly do not provide the motivation or suggestion to combine that is required by Court decisions.

Whether a particular combination might be obvious to try is not a legitimate test of patentability. In re Fine, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Obviousness is tested by what the combined teaching of the references would have suggested to those of ordinary skill in the art. Id. Obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Id. The teachings of references can be combined only if there is some suggestion or incentive to do so. Id. In light of the remarks herein, neither Maruyama et al nor Bödiger et al are deemed to provide the requisite suggestion or incentive to combine their respective disclosures.

Even if Maruyama et al and Bödiger et al were combined, such a combination would not result in the thermoplastic molding composition of Applicants' present claims. The combination of Maruyama et al and Bödiger et al would result in a composition containing both phosphazenes and non-phosphazene phosphorous compounds. The thermoplastic composition of Applicants' present claims has been amended to include closed-end transitional language, and as such is exclusive of non-phosphazene phosphorous compounds.

The rejection impermissibly uses Applicant's application as a blueprint for selecting and combining or modifying the prior art to arrive at Applicant's claimed invention, thereby making use of prohibited hindsight in the selection and application of that prior art. The use of hindsight reconstruction of an invention is an inappropriate process by which to determine patentability, In re Rouffet, 47 USPQ 2d 1453, 1457 (Fed. Cir. 1998). To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher. In re Fine, 837 F.2d at 1075. It is essential that the decision maker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made ... to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art. Id. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. Id.

In light of the amendments herein and the preceding remarks, Applicants' claims are deemed to be unobvious and patentable over Maruyama et al in view of Bödiger et al. Reconsideration and withdrawal of this rejection is respectfully requested.

The rejection (in the previous Office Action of 15 January 2002) of Claims 1-18, 20 and 22 as being unpatentable over Maruyama et al taken with United States Patent No. 4,946,885 (**Weil et al**) and Bödiger et al has not been withdrawn. In light of the remarks in paragraph 8 on page 3 of the present Office Action of 1 July 2002, this rejection appears to have been maintained. This rejection

is respectfully traversed with regard to the amendments herein and the following remarks.

Maruyama et al and Bödiger et al have been discussed previously herein. Weil et al disclose a flame retardant thermoplastic containing an effective flame retardant amount of phospham represented by the following empirical formula $(PN_2H)_x$ (abstract and column 2, lines 37-38). The compositions of Weil et al are disclosed as optionally including finely divided infusible minerals, such as talc (column 4, lines 1-8). However, Weil et al do not disclose or suggest the particle size of the optional finely divided infusible minerals.

The thermoplastics disclosed by Weil et al include styrene-butadiene copolymers, ABS graft copolymers and polyamides. However, Weil et al do not disclose or suggest the presence of aromatic polycarbonates or polyester carbonates in their compositions. See column 1, line 66 through column 2, line 36 of Weil et al.

On page 3 of the Office Action of January 15, 2002, it is stated that Weil et al disclose the previous use of inorganic particulate compounds to promote the effectiveness of phosphazenes. Applicants counter that Weil et al provides no such disclosure or suggestion. Weil et al very generally disclose the previously proposed use of aminophosphazenes as flame retardants (column 2, lines 55-58). Weil et al go on further to state that precursors of phospham, namely **aminophosphazenes, are not equivalents to phospham** as they lack the requisite stability for use in thermoplastics, such as nylon (column 2, lines 61-66). Weil et al are teaching away from the use of aminophosphazenes. Applicants wish to point out that phospham is different from and is not encompassed by the phosphazenes represented by formulas (Ia) and (Ib) of their present claims.

The phosphazenes represented by formulas (I) and (II) on page 4 of Maruyama et al are disclosed as being essential components in their thermoplastic resin compositions. Maruyama et al teach away from the use of phosphorous compounds other than phosphazenes, such as phosphates (e.g., trixlenyl phosphate) and phosphoric esters (e.g., phosphoric ester oligomers). Weil et al disclose the essential presence of phospham in their compositions, and teach away from the use of phosphazenes, in particular aminophosphazenes. As such, neither

Maruyama et al nor Weil et al provide the requisite teaching that would motivate one of ordinary skill in the art to combine their respective disclosures.

Bödiger et al do not disclose or suggest the use of phosphazenes in their compositions. Maruyama et al teach away from the use of phosphorous compounds other than phosphazenes, such as those phosphorous compounds disclosed by Bödiger et al and represented by their formula (VIII). As such neither Maruyama et al nor Bödiger et al provide the requisite teaching that would motivate one of ordinary skill in the art to combine their respective disclosures.


Weil et al disclose the essential presence of phospham in their compositions. The phosphorous compounds of Bödiger et al's compositions are disclosed as including phosphine oxides, derivatives of acids of phosphorus salts of acids and acid derivatives of phosphorus, and phosphorous compounds represented by their formula (VIII), none of which is remotely inclusive of phospham. As such, neither Weil et al nor Bödiger et al provide the requisite teaching that would motivate one of ordinary skill in the art to combine their respective disclosures.

In light of the above discussion, none of the patents relied upon in the rejection provide the requisite teaching, and certainly do not provide the motivation or suggestion to combine that is required by Court decisions. See In re Rouffet supra, and In re Fine supra.

Applicants wish to point out that present Claim 2 has been amended to include closed-end transitional language which serves to exclude those phosphorous compounds as disclosed by Bödiger et al, and the phospham compounds of Weil et al from their compositions. As such, even if Maruyama et al, Weil et al and Bödiger et al were combined as suggested in the Office Actions of 15 January 2002 and 1 July 2002, Applicants' presently claimed composition would not result, in the absence of impermissibly picking, choosing and recombining the various elements of the cited references (i.e., but for the impermissible use of hindsight reconstruction). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. In re Fine, 837 F.2d at 1075. See also In re Rouffet, 47 USPQ 2d 1453, 1457 (Fed. Cir. 1998).

In light of the amendments herein and the preceding remarks, Applicants' presently pending claims are deemed to meet all the requirements of 35 U.S.C. §112, and to define an invention that is unanticipated, unobvious and hence, patentable. Reconsideration of the rejections and allowance of all of the presently pending claims is respectfully requested.

Respectfully submitted,

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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

The Abstract has been replaced with the following.

**FLAME-RESISTANT THERMOPLASTIC POLYCARBONATE MOLDING
COMPOSITIONS CONTAINING PHOSPHAZENES**

ABSTRACT OF THE DISCLOSURE

Thermoplastic polycarbonate molding compositions that include graft copolymers, phosphazenes and finely divided inorganic powder, are disclosed. More particularly, the compositions of the present invention consist essentially of: (A) an aromatic polycarbonate and/or polyester carbonate; (B) a graft polymer; (C) optionally a thermoplastic vinyl (co)polymer and/or polyalkylene terephthalate; (D) a phosphazene selected from those represented by formulas Ia and/or Ib; (E) finely divided inorganic powder having an average particle diameter of less than or equal to 200 nm; (F) optionally a fluorinated polyolefin; and (G) optionally at least one additive, e.g., a lubricant and/or mold release agent. The thermoplastic compositions of the present invention have a desirable combination of: (i) excellent flame resistance; and (ii) improved physical properties including, improved weld-line strength, notched impact strength and environmental stress cracking resistance.

IN THE SPECIFICATION: (Marked-Up)

The Title at the top of page 1 of the specification has been amended as follows.

[Flame-Resistant Polycarbonate/ABS Plastic Molding Materials]

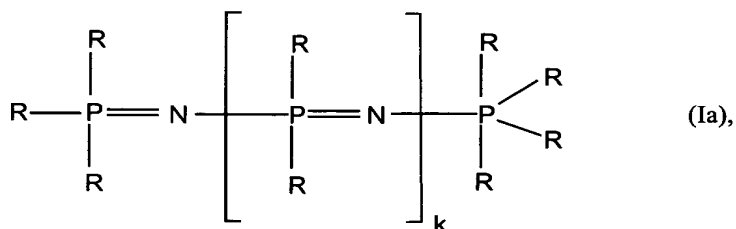
**FLAME-RESISTANT THERMOPLASTIC POLYCARBONATE MOLDING
COMPOSITIONS CONTAINING PHOSPHAZENES**

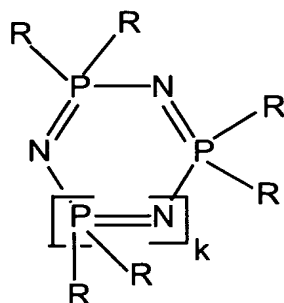
IN THE CLAIMS: (Marked-Up)

The following are versions of the amended claims with markings to show changes made thereto in the present Amendment. As the claims contain bracketing, deletions are shown herein with strikethroughs (i.e., ~~strikethroughs~~) and additions are shown with underlining (i.e., underlining).

2. (Thrice Amended, Marked-Up) A thermoplastic moulding composition containing consisting essentially of:

- A) 40 to 99 parts by weight of at least one of aromatic polycarbonate and polyester carbonate;
- B) 0.5 to 60 parts by weight of graft polymer comprising,
 - B.1) 5 to 95 wt.% of one or more vinyl monomers, and
 - B.2) 95 to 5 wt.% of one or more grafting backbones having a glass transition temperature of $<10^{\circ}\text{C}$;
- C) 0 to 45 parts by weight of at least one thermoplastic polymer selected from at least one member of the group consisting of vinyl (co)polymers and polyalkylene terephthalates;
- D) 0.1 to 50 parts by weight of at least one ~~component~~ member selected from ~~the at least one~~ the group consisting of phosphazenes ~~of the formulae represented by the following formula (Ia) and phosphazenes represented by the following formula (Ib),~~





(Ib),

in which

R is in each case identical or different and denotes (i) at least one member selected from the group consisting of amino and C₁ to C₈ alkyl, in each case optionally halogenated; and (ii) at least one member selected from the group consisting of C₁ to C₈ alkoxy, C₅ to C₆ cycloalkyl, C₆ to C₂₀ aryl and C₇ to C₁₂ aralkyl, in each case optionally substituted by at least one member selected from the group consisting of alkyl and halogen, and

k denotes 0 or a number from 1 to 15;

- E) 0.5 to 40 parts by weight of finely divided inorganic powder having an average particle diameter of less than or equal to 200 nm; and
- F) 0 to 5 parts by weight of fluorinated polyolefin; and
- G) optionally at least one additive selected from the group consisting of lubricants, mould release agents, nucleating agents, antistatic agents, stabilisers, dyes and pigments.

6. (Thrice Amended, Marked-Up) The moulding composition of Claim 2, wherein vinyl monomers B.1 are mixtures prepared from

B.1.1 50 to 99 parts by weight of at least one member selected from the group consisting of vinyl aromatics, ring-substituted vinyl aromatics and methacrylic acid (C₁-C₈)-alkyl esters, and

B.1.2 1 to 50 parts by weight of at least one member selected from the group consisting of vinyl cyanides, (meth)acrylic acid (C₁-C₈)-alkyl esters, and derivatives of anhydrides of unsaturated carboxylic acids and imides of unsaturated carboxylic acids.

7. (Thrice Amended, Marked-Up) The moulding composition of Claim 2, wherein the grafting backbone B.2) is a rubber selected from at least one member of the group consisting of diene rubbers, EP(D)M rubbers, acrylate, polyurethane, silicone, chloroprene and ethylene/vinyl acetate rubbers.

9. (Thrice Amended, Marked-Up) The moulding composition of Claim 2, wherein component E is ~~selected from~~ at least one polar compound selected from the group consisting of one or more metals of main groups 1 to 5 or and one or more metals of subgroups 1 to 8 of the periodic system, with at least one element selected from the group consisting of oxygen, hydrogen, sulfur, phosphorus, boron, carbon, nitrogen and silicon.

10. (Thrice Amended, Marked-Up) The moulding composition of Claim 9, wherein component E is ~~selected from~~ at least one polar compound selected from the group consisting of one or more metals of main groups 2 to 5 or and one or more metals of subgroups 4 to 8 of the periodic system, with at least one element selected from the group consisting of oxygen, hydrogen, sulfur, phosphorus, boron, carbon, nitrogen and silicon.

11. (Thrice Amended, Marked-Up) The moulding composition of Claim 10, wherein component E is ~~selected from~~ at least one polar compound selected from the group consisting of one or more metals of main groups 3 to 5 or and one or more metals of subgroups 4 to 8 of the periodic system, with at least one element selected

from the group consisting of oxygen, hydrogen, sulfur, phosphorus, boron, carbon, nitrogen and silicon.

12. (Thrice Amended, Marked-Up) The moulding composition of Claim 2, wherein component E is ~~selected from~~ at least one member selected from the group consisting of oxide, hydroxide, hydrous oxide, sulfate, sulfite, sulfide, carbonate, carbide, nitrate, nitrite, nitride, borate, silicate, phosphate, hydride, phosphite and phosphonate.

13. (Twice Amended, Marked-Up) The moulding composition of Claim 2, wherein component E is selected from the group consisting of oxides, phosphates and hydroxides.

14. (Thrice Amended, Marked-Up) The moulding composition of Claim 13, wherein component E is selected from the group consisting of TiO_2 , SiO_2 , SnO_2 , ZnO , ZnS , boehmite, ZrO_2 , Al_2O_3 , aluminum phosphates, iron oxides, TiN , WC , $\text{AlO}(\text{OH})$, Sb_2O_3 , ~~iron oxides~~, Na_2SO_4 , vanadium oxides, zinc borate, silicates, doped compounds and mixtures thereof.

15. (Thrice Amended, Marked-Up) The moulding composition of Claim 2, wherein component E is selected from the group consisting of hydrated aluminum oxides, TiO_2 and mixtures thereof.

16. (Cancelled)

17. (Cancelled)

23. (Once Amended, Marked-Up) The molding composition of Claim 14 wherein said silicates are selected from at least one member of the group consisting of Al silicates, Mg silicates, 1-dimensional silicates, 2-dimensional silicates and 3-dimensional silicates.

24. (Added) The moulding composition of Claim 2 wherein component E is
AlO(OH).

APPENDIX

Data sheets from various commercial suppliers of talc, showing the average particle size of their talc products.